S/133/60/000/004/004/0¹0
A054/A026

AUTHORS: Karsanov, G.V.; Tirkina, A.N.; Odoyevskiy, L.S.

TITLE: Investigation of the Process of Chrome Metal Production in a Vacuum

PERIODICAL: Stal', 1960, No. 4, pp. 321 - 327

TEXT: Considerable attention is being paid to the production of chrome metal by reducing its oxides with carbon in vacuum. The problem was reported on by Salli (Ref. 2), Gel'd, Vlasov and Serebrennikov (Ref. 4), Yesin and Gel'd (Ref. 5) and Vertman and Samarin (Refs. 6 and 7). In order to establish the technology and the parameters for this process, tests were carried out by TsNIIChM. A thermodynamic analysis of the reactions possible in the chrome-oxygen-carbon system showed that only a higher carbide of chrome (Cr_3C_2, 13.34% C) could subsist in equilibrium, upon reducing chrome oxide by carbon (with and without vaccum) in the presence of a surplus of carbon. By decreasing the pressure in the reaction zone it was possible to reduce the temperature required for reduction and also to ensure the subsequent decarbonization of carbides by chrome oxide, while obtaining a metal of low C

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content. The tests established the stability range of chrome carbides as a
function of the changes in pressure and the temperature. At 1,400°C and
pressures under 15 mm Hg in the presence of chrome oxides only solid solu-
tions of carbon in chrome were stable. It was found that a metal with a C
constant of about 0.02% could be obtained at 1,400°C and a pressure of 1 mm
of mercury. High vacuum was limited by the great elasticity of chrome va-
pors. The chrome-oxide-carbon reaction in vacuum took place with the aid
of the gas phase according to two-stage process and displayed an adsorptive-
autocatalytic character. In the first stage of reduction a metallic phase
may form, whereas the introduction of C in the crystal lattice of the metal
with the formation of carbides takes place in the secondary stage in which
the gas phase participates. The completeness of the process and consequent-
ly the quality of the metal produced depends on the kinetics of the final
reduction period in which the product is decarbonized by chrome oxide. In
this period diffusion is of great importance. Chrome oxides of the following
composition were tested: Sample 2276: FeO 0.028%; SiO$_2$ 0.04%; S 0.070%;
C 0.020%; H$_2$O 0.08%; Sample 2370: FeO 0.070%; SiO$_2$ traces, S 0.038%; C

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0.11%, H_2O 0.03%. Pitch coke and charcoal dried and ground to 0 .- 0.15 mm were applied as reducing agents; the samples were pressed and briquetted into pieces of 35 mm in diameter and each containing 50 g of chrome and suf_ ficient reducing agents. For the coke treatment a 5% aqueous solution of chrome anhydride (4 ml for 100 g chrome oxide) and for the charcoal treat_ ment an aqueous solution of molasses (20 ml for 100 g chrome oxide) were ap_ plied as binding agents. The test equipment contained an apparatus simulat_ ing a TBB(TVV) type vacuum pot kiln, a ЦНИМЧМ-1 (TsNIIChM-1) type tungsten_ molybdenum thermocouple, ВН-2 or ВН-1 and БН-3 type (VN-2, VN-1 and BN-3) vacuum pumps, a BT-2 (VT-2) type vacuum gauge. The kinetics of the process were tested by the amount of gas separated during the reaction. An inverse relation between the C content and the oxygen content of the produced metal was established. During the one-stage reaction a metal with a low carbon content (0.02 - 0.03%) was produced. In the initial stage the reduction of chrome oxide developed rapidly, while carbides formed which were decarbon_ ized due to the interaction with chrome oxide. The decarbonization of chrome carbides (mainly of $Cr_{23}C_6$) and of the C solutions in chrome was the

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most important feature of the entire process. The effect of temperature, the quality of reducing agents, the fineness of the particles of chrome oxides and the rate of vacuum as the main parameters of the process were also investigated. Upon comparing the test results, the priority of the technological process with two stages could be ascertained, where in the first reduction stage no vacuum is applied, whereas in the second (after repeated grinding to 0 - 0.15 mm) and briquetting (without binding agents) the product is treated in vacuum. When reducing chrome oxide by carbon at 1,300 - 1,400°C temperature and atmospheric pressure with a charge of such a composition that the decarbonization of the metal in a vacuum can be obtained, a product containing 5.2 - 6.8% C and 7.0 - 8.2% oxygen, mainly Cr_7C_3 and a surplus of chrome oxide will be produced. The process takes two hours at 1,300°C and 1.5 hours at 1,400°C, inclusively 1 hour of heating up to the required temperature. Repeated grinding and briquetting before the vacuum treatment promotes the diffusion of the reagents. The metal produced has a low C content and a still lower residual amount of oxygen (about 0.5%). There are 11 figures and 11 references: 9 Soviet and 2 English.
ASSOCIATION: TsNIIChM

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"An Investigation of the Mobility of Carbon Atoms in Steel and Alloys with the Use of the Isotope C^{14}," with Gruzin, P. L., Dr. Phys. and Math. Sci.; Babikova, Ye. F.; Borisov, Ye. V.; Zemskiy, S. V.; Peregudov, N. P.; Polikarpov, Yu. A.; Fedorov, G. B., C nd. Tech. Sci.; Shumilov, M. A., Cand. Tech. Sci., page 327.

In book Problems of Physical Metallurgy, Moscow, Metallurgizdat, 1958, 603p. (Its: Sbornik trudov, v. 5)

The articles in the book present results of investigations conducted by the issuing body, Inst. of Physical Metallurgy, a part of the Cent. Sci. Res. Inst. of Ferrous Metallurgy, located in Dnepropetrovsk. The investigations were concerned with phase transformations in alloys, strengthening and softening processes, diffusion processes (studied with the aid of radioactive isotopes), and certain other questions.

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D217/D303

18·/r3v

AUTHORS: Karsanov, G.V., Tirkina, A.N., and Odoyevskiy, L.S.

TITLE: Problems associated with the vacuum metallurgy of chromium

SOURCE: Akademiya nauk SSSR. Institut metallurgii. Issledova-
               niya po zharoprochnym splavam, v. 7, 1961, 276 - 279

TEXT: For the study of the basic principles and parameters of the process, the authors reduced chromic oxides with carbon in vacuum, using commercially pure chromic oxide. The latter was quenched from 800 - 900°C, sieved through a sieve of definite size, and the remainder was reground. Coke and wood charcoal, dried and ground to 100 mesh, were used as reducing agents. The required proportions of the charge materials were thoroughly mixed and briquetted in a 5-ton press into cylindrical briquettes of 35 mm diameter. A 5 % aqueous solution of chromic anhydride (4 ml/100 g of chromic oxide) was used as the binding material for reduction with coke, and an aqueous solution of molasses (spec. grav. 1042 g/cm^3) for reduction

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with wood charcoal (20 ml/100 g chromic oxide). The briquettes for testing, containing 50 g of chromic oxide and the required weight of reducing agent, were placed into alumina crucibles and charged into an appropriate furnace. The kinetics of reduction were studied from the volume of gas evolved which was passed through a counter. The study of the influence of temperatures, weight of reducing agent, fineness of the chromic oxide and degree of vacuum on the kinetics of reduction of chromic oxide with carbon in vacuum has shown that the rate of reactions in the final stage of the process is limited by the rate of diffusion of the reagents. The kinetic curves of the diffusion period are parabolic in nature. The investigation showed the considerable advantages of the two-stage process, in which the first reduction stage is carried out without vacuum, and the product obtained after the second grinding operation and briquetting is further reduced in a vacuum furnace. There are 2 figures and 14 references: 9 Soviet-bloc and 5 non-Soviet-bloc. The references to the English-language publications read as follows: W. J. Kroll and W.W. Schlechten, Trans. Electrochem. Soc., 93, 1948; US Pat. 2,833,645, May 6th, 1958; US Pat. 2,850,378, September 2nd, 1958.

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X

KARSANOV, G.V.; TIRKINA, A.N.; ODOYEVSKIY, L.S.

Vacuum metallurgy of chromium. Issl. po zharopr. splav. 7:276-279
'61.   (MIRA 14:11)
            (Chromium--Metallurgy) (Vacuum metallurgy)

TIRKINA, A. N.

AUTHORS: Gruzin, P. L., Babikova, Yu. F., Borisov, Ye. V., Zemskiy, S. V., Peregudov, N. P., Polikarpov, Yu. A., Tirkina, A. N., Fedorov, G. B., Shumilov, M. A.

TITLE: Study of the Mobility of Carbon Atoms in Steel and Alloys Using C14 Isotope (Izucheniye podvizhnosti atomov ugleroda v stali i splavakh pri pomoshchi izotopa C14)

PERIODICAL: Sb. tr. In-t metalloved. i fiz. metallov Tsentr, n.-i. in-ta chernoy metallurgii. 1958, Vol 5, pp 327-365

ABSTRACT: The authors examine methods for investigating the diffusion, electrolytic transfer, and distribution of C in Fe, Ni, and some of their alloys. Data were obtained by the direct (autoradiographic) method on the effect of Cr, Ni, Mo, and Si on the diffusion of C in ferrite; Ni and Si have appreciably less effect on the diffusion of C than the carbide-forming Cr and Mo. It was established that the diffusion-mobility level changes very little when the Fe and Ni are highly alloyed; it is displaced only when another base is used, as it happens in Fe-Cr, and under these conditions the mobility level of C approaches that of the

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alloying elements. It was experimentally verified that the C in Fe and Ni is in the cation state. It was established that the cation charge can change depending upon the character of the alloying element. Bibliography: 27 references.

M. G.

Card 2/2

GRUZIN, P.L.,doktor fiz.-mat.nauk; BABIKOVA, Yu.F.; BORISOV, Ye.V; ZEMSKIY, S.V.;
    PEREGUDOV, N.P.; POLIKARPOV, Yu.A.; TIRKINA, A.N.; FEDOROV, G.B.,kand.
    tekhn.nauk; SHUMILOV, M.A.,kand.tekhn.nauk

    Studying the migration of carbon atoms in steels and alloys by means
    of the isotope C14. Probl. metalloved. i fiz. met. no.5:327-365 '58.
            (Steel--Metallography) (Carbon--Isotopes)   (MIRA 11:4)
            (Diffusion)

IOFFE, B.M.; TIRKINA, T.N.; YAKUSHEVA, T.S.

Effect of roentgen irradiation of the brain on glycemia and on gly-
cosuria in experimental diabetes. Vest.rent.i rad. no.1:42-49 Ja-F
'55.   (MIRA 8:5)

1. Iz otdela patofiziologii (zav. prof. S.M.Leytes) Vsesoyuznogo
instituta eksperimental'noy endokrinologii (dir.prof.Ye.A.Vasyukova).
        (DIABETES MELLITUS, experimental,
            eff. of x-irradiation of brain on blood & urine sugar)
        (BRAIN, effect of radiations on,
            x-ray, blood & urine sugar in exper. diabetes)
        (ROENTGEN RAYS, effects,
            on brain, blood & urine sugar variations in exper.
            diabetes).

DUSAN, V.; TIRLEA, D.

The force of united labor. St si Teh Buc 14 no.12:6 D'62.

1. Chairman, "Flcara" Collective Farms, Varias, Banat region (for Dusan). 2. Deputy Chairman, "Flacara" Collective Farms, Varias, Banat region (for Tirlea).

SURNAME, Given Names

Country: Rumania

Academic Degrees: /not given/

Affiliation: Pediatrics Clinic (Clinica de Pediatrie), Timisoara.

Source: Timisoara, Timisoara Medicala, No 2, Jul-Dec 60, pp 1-11

Data: "Hormone Therapy in Sokolski-Bouilland Rheumatism."

Co-authors:

MASCA-CIOBANU, L., /degree not given/, Pediatrics Clinic, Timisoara.

MORATH-MINDA, C., /degree not given/, Pediatrics Clinic, Timisoara.

TIRLEA, I., prof.; MASCA-CIOBANU, L., dr.; MORATH, C., dr.; STANCIU, M., dr.; STAMBULIU, S., NUBERT, S., dr.

The clinical study, evolution and prognosis of chronic evolutive polyarthritis in children. Med. intern., Bucur 12 no.9:1375-1384 S '60.

(ARTHRITIS, RHEUMATOID, in inf & child.)

TIRLEA, I., prof.; TUREANU, L., assist. prof.; HERZOVI, F.; ELIAS, M.

Investigations concerning the phenomenon of renal osmotic regulation
in immature infants. Rumanian M Rev. no.2:47-50 Ap-Je '60.
    (KIDNEY physiology)   (INFANT PREMATURE physiology)
        (WATER-ELECTROLYTE BALANCE physiology)

TIRLEA, I.; MASCA-CIOBANU, L.

Characteristics of rheumatism in children between the ages of 2 and 5
years. Probl. reumat., Bucur. no.5:99-101 1958.
    (RHEUMATIC FEVER, manifestations
       in child. aged 2 to 5)
    (RHEUMATIC HEART DISEASE, manifestations
       in child. aged 2 to 5)

TIRLEA, Iuliana, prof.; LAZAR-GAROIU, Felicia, dr.; LUSTIG, I., dr.;
CETERCHI, Doina, dr.; PAKAT, Eva, dr.; HENDEA, Gh. dr.

Characteristics of ulcerous disease in childhood. Pediatria
(Bucur.) 13 no.6:191-199 N-D '64.

1. Lucrare efectuata in Clinica I de pediatrie, Cluj.

TIRLEA, J.; CUCU-CABADAIEF, L.; BICLESANU, A.; STERN, A.

Function tests in rheumatic fever. Cesk. pediat. 20 no.11:
964-966 N '65.

1. I. detska klinika Cluj (Rumunsko) (prednosta prof. dr.
J. Tirlea).

RUMANIA

TIRLEA, P., Professor.

Clinic of Dermatovenerology of the Institute of Medicine
and Pharmacy (Clinica de dermatovenerologie a I.M.F.),
Cluj.

Bucharest, Viata Medicala, No 8, 15 Apr 63, pp 519-525.

"Occupational Dermatoses in the Sector of Agriculture and
Animal Husbandry."

(1

RUMANIA

TIRLEA, S., Engineer, Poultry Trust (Trustul gostat Constanta)

"Application of the "All-in-All-out" Principle as a Basic Tenet in Poultry Farming"

Abstract: Schematic program for rotating generations of chickens and hens through poultry farm in 63 weeks, or 441 days, including a 28 day interval to clean and repair the facilities; and 413 of actual care of poultry with 3 cycles of chickens brought through during that time. Technical details are given on optimal sequence of various breeds and number of birds, with examples as seen on some Rumanian farms. 3 diagrams.

1/1

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Clinical, bacteriological, and epidemiological study of staphylococcal infection cases in the Timisoara Pediatric Clinic during 1957-1959. Microbiologia (Bucur) 6 no.1:29 Ja-F '61.

TIRLEA, T.; POPPER, A.

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(INDUSTRIA TEXTILA. Vol. 8, No. 6, June 1957, Bucuresti, Rumania)

SO: Monthly List of East European Accessions (EEAL) Lc. Vol. 6, No. 10, October 1957. Uncl.

BACIU, Emil, ing.; TIRNACOP, Gh., tehnician

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1. Machine-tractor Station, Draganesti-Vlasca.

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TIRNOVEANU, Mircea

A transfinite logical domain. Comunicarile AR 11 no.9:1017-1023 S '61.

1. Comunicare prezentata de academician G. Vranceanu.

TIRNOVEANU, Mircea

Some properties of the complete topologic structures S-D-. Comunicarile
AR 11 no.9:1025-1031 S '61.

1. Comunicare prezentata de academician G. Vranceanu.

TIRNOVEANU, Mircea

Some properties of the normal divisor structures ST-. Comunicarile
AR 11 no.9:1033-1038 S '61.

1. Comunicare prezentata de academician G. Vranceanu.

TIRNOVEANU, Mircea

Some differential properties of the logical domains K-. Comunicarile
AR 11 no.10:1175-1178 O '61.

1. Comunicare prezentata de academician Miron Nicolescu.

TIRNOVEANU, Mircea

On the function of logical expression ϕ . Comunicarile AR 11 no.12:1417-1422 D '61.

1. Comunicare prezentata de academician G. Vranceanu.

TIRNOVEANU, Mircea
SURNAME, Given Names

Country: Rumania

Academic Degrees: -not given-

Affiliation: -not given-

Source: Bucharest, Comunicarile Academiei Republicii Populare Romine,
        Vol XI, No 12, 1961, pp 1411-1422.

Data:" Regarding the Logical Expression Function Φ ."

TIRNOVEANU, Mircea
SURNAME (in caps); Given Names

Country: Rumania

Academic Degrees: -not given-

Affiliation: -not given-

Source: Bucharest, Comunicarile Academiei Republicii Populare Romine,
Vol XI, No 9, 1961, pp 1005-1009; 1017-1023; 1025-1031; 1033-
Data: 1038.
"On Some Differential Properties of K-logical Domains. I."

" On a Transfinite Logical Domain."

"On Some Properties of Complete S-D-Topological Structures."

"On Some Properties of Normal ST-Divisor Structures."

TIROVEANU, Mircea
SURNAME, Given Names

Country: Rumania

Academic Degrees: -not given-

Affiliation: -not given-

Source: Bucharest, Comunicarile Academei Republicii Populare Romine, Vol XI, No 10, 1961, pp 1175-1176.
Data: "Some Differential Properties of K-logical Domains. II."

TIRNOVEANU, Mircea

On a general semiconstructive system. Bul Inst Politeh 26 no.5:
17-22 S-O '64.

1. Chair of Mathematics, Polytechnic Institute, Bucharest.

TIRNOVEANU, Mircea

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1. Comunicare prezentata de academician G. Vranceanu.

; KULESHOVA, K.; TIRNSHTEYN, B.

Observations of lunar occultations of stars in Tashkent.
Astron.tsir. no.140:18 Ag '53.

(MLRA 7:1)

1. Astronomicheskaya observatoriya Akademii nauk Uzbekskoy SSR
(Tashkent).

(Occultations)

TIRNSHTEYN,B.

Observations of lunar occultations at Tashkent. Astron.tsir.
no.157:22 F'55.

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1. Astronomicheskaya observatoriya AN Uz SSR (Tashkent)
(Occultations)

TIRO, A.

Experimental investigation of test differential drive of a belt conveyor.
Khim. i tekh.gor.slan. i prod. ikh perer. no.12:82-89 '63.
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TIPO, A.M., ... , ... JAGER, V.M.

Determining the maximum operative capacity of the loading machines for the chamber sections of oil shale mines. Khim. i tekh. gor. slan. i prod. ikl nefer no.13:56-60 '64. (MIRA 18:9)

TIRO, A.M.; SMIRNOV, C.V.; DYKOV, O.V.

Investigating the relation between the number of switchings of the crawlers of loading machines and some factors in the stoping chambers of oil shale mines. Khim. i tekh. gor. slan. i prod. ikh perer no.13:61-66 '64.

(MIRA 18:9)

TIRO, A.M.

Determining the permissible coefficient of failure and overhaul life for the machinery complexes of the stoping equipment in oil shale mines. Khim. i nekh. gor. slan. i prod. ikh perer no.13: 67-73 '64.

(MIRA 18:9)

TIRO, A.M.

Efficiency of the driving drums of a drive with a differential mechanism. Khim. i tekh. gor. slan. i prod. ikh perer. no.10: 84-89 '62.

Selecting the drive system and the degree of symmetry in the differential drives of belt conveyors. Ibid.:90-101

(MIRA 17:5)

ISTVAN, Lajos, dr.; TIROLER, Zoltan, dr.

Blood transfusion in tuberculosis. Orv. hetil. 96 no.6:159-161
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1. Az Orsabos Vertransfusios Szolgalat (igazgato: foorvos: Sores
Balint dr.) Szombat helyi Alkozpontjanak, a Vasmegyei Tanacs
Korhaza (igazgato: foortos: Szvoboda Jeno dr.) Vertransfusios es
Tudosebeszeti Osztalyanak kozlemenye.
        (TUBERCULOSIS,
            blood transfusion in)
        (BLOOD TRANSFUSION, in various diseases,
            tuberd.)

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Discussions on the article "Technical progress, a deter-
mining factor in increasing labor productivity and in im-
proving the product quality in the shoe industry." Industria
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Technical and operative organization of shoe factories. Industria
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TIRON, Emilian, ing.

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Investigating the accuracy of Stokes and Vening-Meinesz formulas.
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(Earth—Figure)   (MIRA 14:7)

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Some problems on the calculation of external gravitational elements of the earth. Rev geodezie 7 no.2:21-32 '63.

TIRON, Zoya Mikhaylovna; RUPPERT, L.L., otv. red.; RUSAKOVA, G.Ya.
red.

[Hurricanes] Uragany.   Leningrad, Gidrometeor. izd-vo, 1964.
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climatization and Annual Culture of Carp." All-Union Sci Res Inst of the
Lake and River (Fish) Economy. Leningrad, 1955. (Dissertation for the
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SIDOROV, N. N.

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J. S. Joffe

ASB.SLA METALLURGICAL LITERATURE CLASSIFICATION

TIRATSUYAN, G.Kh.

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TIRNOVEANU, Mircea

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11-16 Ja '63.

· 1. Comunicare prezentata de academician G. Vranceanu.

TIRNOVEANU, Mircea

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cerc mat 14 no.3:485-491 '63.

TIRNOVEANU, Mircea

    On a communication system of first degree. Comunicarile AR
13 no.8:703-709 Ag'63.

1. Comunicare presentata de academician Al.Ghika.

TIRNOVEANU, Mircea

On the logical deductive operations P,Q, and the function $\mathcal{J}$.
Comunicarile AR 12 no.2:177-18? F '62.

1. Comunicare prezentata de academician G. Vranceanu.

TIRNOVEANU, Mircea

Extensions of the types P and Q of the logic $\mathcal{L}$ $\overset{S}{\mathcal{N}}$. Comunicarile
AR 12 no.3:269-273 Mr '62.

1. Comunicare prezentata de academician G.Vranceanu.

TIRNOVEANU, Mircea

On the function of the logical valence ψ . Comunicarile AR 12 no.6:623-629 Je '62.

1. Comunicare prezentata de academician G. Vranceanu.

TIRO, A.M.

Effect of change in elastic sliding on the tractive capacity of a flexible coupling. Khim. i tekh. gor. slan. i prod. ikh perer. no.11:65-72 '62.

Effect of a locking flexible coupling on the tractive capacity of the differential drive of a belt conveyor. 73-79

Investigating the appearance of additional tension in a belt in the two-cylinder drive of a belt conveyor with a rigid coupling between the cylinders. 80-87   (MIRA 17:3)

TIRON, Emilian, ing.; GOLDEN, Arry, ing.

Creative work, a means towards better quality shoes.
Industria usozra 10 no.9:378-383 S '63.

NAZAROV, M.S.; OVSYANNIKOV, N.G.; SOYUZOV, A.A.; MITAISHVILI, A.A.;
    YUDIN, P.G.; SOLOV'YEV, I.F.; SVIRIDOV, A.A.; RUMYANTSEV, S.M.;
    KOLICHENKO, K.N.; NIKULIN, M.R.; ORLOV, D.A.; MAYORSKIY, G.I.;
    SEMENOV, I.Ya.; SUTYRIN, M.A.; KOVALEV, A.I.; VLASOV, A.A.;
    LEVIN, Ya.L.; KLIMOVITSKIY, A.Z.; METAL'NIKOV, G.F.; PANUSHKIN,
    G.P.; CHECHETKIN, A.V.; MIKHEYEV, V.D.; KOLOKOL'NIKOV, K.A.;
    MOISEYEVA, A.I.; TIRON, G.I.; KRYLOVA, V.F.; GOFMAN, Ya.M.;
    BUDCHANOV, B.F.

K.I. Korshunova; an obituary.   Rech. transp. 20 no.12;59 D '61.
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TIRON, K. D.

Theoretical Bases of the Action of the Depth Gauge in the Open Sea in the
Raushel'bakh System. Works of the GOIN, No 1 (13). 1947 (276-290)

Rpt U 2392, 22 Sept 1952

TIRON, K.D.

Nonperiodical level variations in the White Sea. Uch.zap.LGu
no.309:78-91 '61.

(White Sea—Hydrology)   (MIRA 15:3)

TIRON, K.D.

The hydrostatic principle and its application to the measurement
of level variations in the open sea. Trudy AANII 210:38-45 '61.

(MIRA 14:11)

(Tide gauges)

TIRON, MARIN

Bucharest, Stiinta si Tehnica, Vol XIV, No 4, Apr 1962

1. "From the Battle of the Union of Working Youth Under the Leadership of the Party, 1922-1962"; pp 3-5.

2. "One of the Thousands of Youngsters," I. V.; pp 5.
(A member of the Union of Working Youth)

3. "The Joy of the First Flight"; pp 6.
(Interview with a young engineer)

4. "The Success of Our Firms"; pp 6.
(A pond-liberated breeder at a cooperative farm)

5. "The Antarctica, Site for Continent Permits Ice Mysteries," M. ANDRIESCU; pp 7-9.

6. "The Use of Manures on Acid Soils," Eng. Marin Candidate in Agricultural Sciences, Cand. Agron. Stiinta smTehnic); pp 10-11.

7. "Novelties in Sojmprications," 12.

8. "Gravity," Eng. Marin TIRON, Candidate in Technical Sciences (Candidat-in-stiinte tehnice); pp 14-17.

9. "Anti-Gravity," Eng. Ioan TODFIN; pp 14-17.

10. "72,000 in 1 Incora per Anniu of Vegetables," I. and I. TROFIN; pp 18-19.

11. "How a Fluorescent Tube is Born," Eng. D. SAVROXI, and I. TROFIN-ROSMARU; pp 20-22.

12. "12 April 1961. A Year Since I Was Penetration Into the Cosmos," Eng. Ion Pascanu, Conf Univ, Secretary (Service) of the Astronomical Commission of the Academy of the Rumanian People's Republic (Academia R.P.R.); pp 24-25.

13. "The Offensive Against Cancer Continues," Dr E. RADULIAN; pp 26-27.

14. "Life in the Universe," Cailn FRUTICI, Prof Univ; pp 28-29.

15. "The Intercepting of Rockets," Eng. D. St. ANDREESCU; pp 30-33.

16. "Another Enigma Elucidated. The Mystery of Cretan Writing," Eng T. TEODORESCU and P. CERNIA, Lector Univ; pp 34-35.

— 1/2 —

L 3736-66

ACCESSION NR: AP5027641

AUTHOR: Tiron, Marin (Doctor) (Bucharest); Strutu, Constantin (Bucharest)

CZ/0023/65/009/002/0137/0144

TITLE: Some problems regarding the method of solution of Molodenskiy's integral equation for the Earth considered as a plane [This paper was presented at the Symposium on the Determination of the Figure of the Earth, October 6 – 10, 1964, Prague]

SOURCE: Studia geophysica et geodaetica, v. 9, no. 2, 1965, 137-144

TOPIC TAGS: integral equation, geodesy, gravimetry

Abstract [Author's Russian summary, modified]: The article pre-
sents certain concepts regarding the solution of Molodenskiy's
integral equation for the case of a flat Earth. It is emphasized
that according to the formulas recommended by the author the
influences of the central zone are considered more precisely
than with previously known equations. Formulas are cited for
the construction of the corresponding master curves in two vari-
ants. In the first variant the region of integration is divided
into rectangles of equal size. In the second variant there is a
division into rectangles of equal influence, and thus of unequal
dimensions. It is considered that the second variant can be used
also in calculating corrections for relief.

Card 1/2

L 3736-66

ACCESSION NR: AP5027641

ASSOCIATION: none

SUBMITTED: 06Oct64

NO REF SOV: 005

ENCL: 00

OTHER: 002

SUB CODE: ES, MA

JPRS

Card 2/2

9. 9867 (1538)

R/002/62/000/004/001/004
D272/D304

AUTHOR: Tiron, Marin, Engineer, Candidate of Technical Sciences

TITLE: Gravitation

PERIODICAL: Stiinta si tehnica, no. 4, 1962, 14-17

TEXT: After briefly reviewing the characteristics of gravity in the uni-
verse, recent studies in the field of gravitational fields and their pro-
pagation are briefly described. Mentioned first is the suggestion of
V.B. Braghinsky and G.I. Rukman to construct two parallel groups of cy-
lindrical piezo-crystals (barium titanate), perfectly insulated (thermally,
acoustically, mechanically), each disc having a surface of 1 m^2, 2000 discs
in each group (a piezo-crystal of 5 m^3 may generate gravitational waves of
10^{-13} erg/sec.) If these groups are forced to oscillate simultaneously
(period coincidence) a purely gravitational connection is formed. Men-
tioned further are the hypotheses of D. Ivanenko, A. Sokolov, and A.
Droski, maintaining that there are graviton-quanta of the gravitational
field, capable of transforming into electrons- positrons or photons and

Card 1/2

Gravitation

R/002/62/000/004/001/004
D272/D304

vice-versa, the demonstration by A.S. Kompaneyets indicating that discussion on application of gravitational waves is still premature, and the supposition of D. Ivanenko that the phenomenon of screening the gravity forces will be studied best by means of gravimetric devices installed on artificial satellites. The possible developments after magnetic fields -- a million times more powerful than the present-- are realized in the laboratory, are briefly mentioned. There are 3 figures.

Card 2/2

TIRON, M.; STROIU, C.

Some problems on solving the Molodenski integral equation for
the earth considered a plane. Rev geodezie 9 no.1:26-47 '65.

TIRON, M., ing.

On the International Symposium concerning the Earth Form Theory.
Rev geodezie 9 no.1:67-68 '65.

TIRON, M. I. (Rumaniya)

Studying the precision of the Vening-Meinesz formula for de-
termining the deflection of vertical lines. Geod. i kart.
no.11:23-29 N '58.   (MIRA 11:12)
          (Plumb-line deflections)

3(4)

AUTHOR: Tiron, M. I. (Roumania)   SOV/6-58-11-4/15

TITLE: Check of The Accuracy of the Formula by Vening-Meynes for
             the Determination of Deviations of Plumb Lines
             (Issledovaniye tochnosti formuly Veninga-Meynesa dlya
             opredeleniya ukloneniy otvesnykh liniy)

PERIODICAL: Geodeziya i kartografiya, 1958, Nr 11, pp 23-29 (USSR)

ABSTRACT: 1928 Vening-Meynes showed for the first time that the
             deviations of the plumb lines on the surface of the geoid
             can be determined from gravimetrical data. He differentiated
             Stokes' (Stoks) relation, and obtained formula (1). M. S.
             Molodenskiy suggested to use data from astronomical survey-
             ing and from gravimetrical measurements for the determina-
             tion of gravimetrical deviations. He further showed that
             Stokes' formula does not offer means for an exact investi-
             gation of the geoid shape. He proposed to investigate the
             shape of the physical surface of the earth instead of that of
             the geoid. The calculations of the deviations of the plumb
             line according to the method by Molodenskiy on a model were
             carried out by V. F. Yeremeyev. The calculated values fully
Card 1/2   agree with the experimental data. This paper includes a study

Check of the Accuracy of the Formula by   SOV/6-58-11-4/15
Vening-Meynes for the Determination of Deviations of Plumb Lines

of the accuracy of the Vening-Meynes formula on a model, which
represents actual conditions encountered in mountainous, hilly,
and level terrain. The considerations advanced in this paper
permit to make the following statements: 1) The data obtained
by the Vening-Meynes formula rather give the deviations of the
plumb line on the physical surface of the earth and as a rule
do not represent the deviation of the plumb line on the geoid.
2) The errors in the determination of the deviations of the
plumb line on the physical surface of the earth depend upon
the gradient α of the element of the physical surface. Results
obtained by V. F. Yeremeyev (Ref 3) show that the deviations
of plumb lines calculated according to M. S. Molodenskiy's
formula almost coincide with the exact values. The differences
obtained here are therefore due to the calculations made
according to Molodenskiy's formula and those according to
Vening-Meynes' formula. Consequently, when calculating plumb
lines in mountainous regions, Molodenskiy's formula is to be
employed. There are 4 figures, 2 tables, and 3 Soviet
references.

Card 2/2

TIROVSKA, St.; GROZEV, G.

Accelerated inter-row cultivation of maize. Izv mekh selsko stop BAN no. 2:65-79 '62.

Z/037/62/000/005-6/047/049
E140/E520

AUTHORS: Ďurček, J. and Tirpák, A.

TITLE: 3 cm Directional coupler using cyclotron resonance in a gas discharge

PERIODICAL: Československý časopis pro fysiku, no.5-6, 1962, 720-722

TEXT: A gas-discharge tube in a magnetic field parallel to the wide side of a rectangular waveguide gives a directional effect of the order of 15 - 30 dB. The effect may be utilised for control and modulation purposes. There are 3 figures.

ASSOCIATIONS: Katedra fyziky Vyzokej školy dopravnej, Žilina (Physics Department of the High School of Transport, Zilina) (Ďurček)
Katedra exper. fyziky Prírodovedeckej fakulty Univerzity Komenského, Bratislava (Department of Experimental Physics, Faculty of Natural Sciences, Komensky University, Bratislava) (Tirpák)

Card 1/1

DURCEK, J.; TIRPAK, A.

Directional coupler in 3 cm band using the cyclotron resonance
in gaseous discharge. Cs cas fys 12 no.5/6:720-722 '62.

1. Katedra fyziky, Vysoka skola dopravna, Zilina (for Durcek).
2. Katedra experimentalni fyziky, Prirodovedecka fakulta
University Komenskeho, Bratislava (for Tirpak).

Z/045/63/000/001/003/003
E024/E309

AUTHORS: Lampert, Miloš, Šranko, Silvester, Šurka, Štefan
                and Tirpák, Andrej

TITLE: Measurement of relaxation times by the spin-echo
                method

PERIODICAL: Matematicko-fyzikálny časopis, no. 1, 1963, 80 – 95

TEXT: A short theoretical analysis of the spin-echo effect
is given and a nuclear spin-echo spectrometer developed by the
authors is described. This spectrometer, adapted for the Hahn (A)
and Carr-Purcell (B) methods in the frequency range of 13 to
17 Mc/s, enables the measurement of longitudinal (T_1) and trans-
verse (T_2) relaxation times in the range 5×10^{-4} to 10^{-1} sec
with an accuracy of less than 10%. A detailed description of the
apparatus is given (Fig. 4.). The square pulse generator supplies
pairs of pulses for method A (E.L. Hahn – Phys. Rev. 80, 1950,
580) or a series of pulses for method B (Carr, Purcell, Phys.
Rev. 94, 1954, 630). The width of the pulses varies between
10 μs and 0.01 sec. The time between pulses can be adjusted
between 7 μs and 0.4 sec, and the time between series of pulses is
Card 1/3

Z/045/63/000/001/003/003
E024/E309

Measurement of ....

adjustable from 0.1 µs to approximately 20 sec. The amplitude of
the pulses is 10 V. The triggered HF generator can be tuned
between 13 and 17 Mc/s. The maximum volume of samples which can
be inserted into the instrument is 0.6 c.c. The HF receiver has a
bandwidth of 0.3 Mc/s and a sensitivity of about 1 µV for a signal-
to-noise ratio of unity. The magnetic field is obtained from an
electromagnet with pole pieces 10 cm in diameter and about 3 cm
apart. The required fields vary between 3050 and 3990 gauss. The
current is obtained from NiFe batteries. To verify the performance
of the instrument, the longitudinal (T_1) and transverse (T_2)
relaxation times of aqueous solutions of $CuSO_4$ and of $K_3Cr(SCN)_6$
were measured as functions of the concentration. The measurements
on $CuSO_4$ are in good agreement with those obtained by Pfeifer
(Ann. Phys., 20, 1957, 322). The variation in the relaxation
time in the $K_3Cr(SCN)_6$ aqueous solution is due to hydration. The
measurements were carried out at 18 °C. Relaxation times between
5×10^{-4} and 10^{-1} sec could be measured with an error less than 10%.
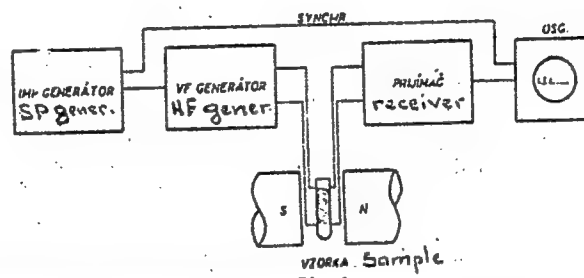There are 10 figures.

Card 2/3

Measurement of ....

Z/045/63/000/001/003/003
E024/E309

ASSOCIATION: Katedra experimentálnej fyziky Prirodovedeckej
fakulty Univerzity Komenskeho v Bratislave
(Department of Experimental Physics, Komensky
University, Bratislava)

SUBMITTED: August 10, 1962

Fig. 4:

Card 3/3

TIRPAK, L.

Improving our work on railroads.   p. 218.
ZELEZNICE, Prague, Vol. 4, no. 8, Aug. 1954.

SO: Monthly List of East European Accessions, (EEAL), LC, Vol. 5, No. 6,
     June 1956, Uncl.

TIRPAK, L.

Soviet locomotive engineers for heavy tonnages as our example.   p. 285.
ZELEZNICE, Prague, Vol. 4, no. 11, Nov. 1954.

SO: Monthly List of East European Accessions, (EEAL), LC, Vol. 5, No. 6,
June 1956, Uncl.

TIRPAK, L.

Experimental drive with a record load, p. 321, ZELEZNICE (Ministerstvo dopravy) Praha, Vol. 4, No. 12, Dec. 1954

SOURCE: East European Accessions List (EEAL) Library of Congress, Vol. 4, No. 12, December 1955

TIRSKIY, L. A.

TIRSKIY, G. A.: "Inverse solutions of a problem of free and forced heat convection". Moscow, 1955. Moscow state U imeni M. V. Lomonosov. (Dissertations for the Degree of Candidate of Physicomathematical Sciences)

SO: Knizhnaya letopis', No. 52, 24 December 1955. Moscow.

Variable cross-sect... ... Cl ... ... tr.ry

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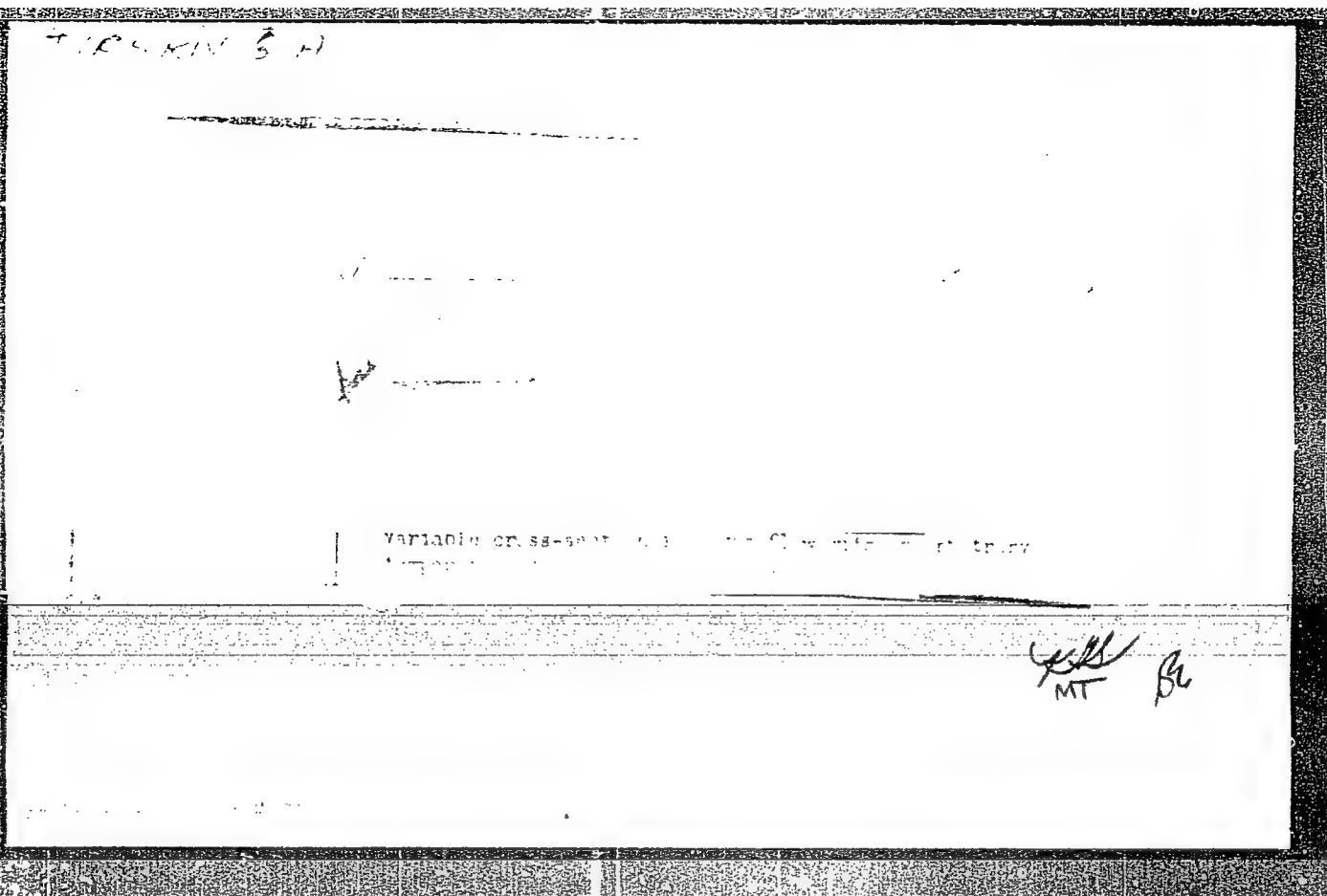
SOV/24-58-7-18/36

AUTHOR: Tirskiy, G.A. (Moscow)

TITLE: On Non-stationary Heat Transmission Through a System of Discs Rotating in a Viscous Liquid (O nestatsionarnoy teploperedache cherez sistemu diskov, vrashchayushchikhsya v vyazkoy zhidkosti)

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, 1958, pp 106 - 107 (USSR)

ABSTRACT: The present paper is concerned with the generalisation of the problem discussed by the author in Ref 1. The case of n discs is considered. Each of the n coaxial discs has a finite thickness d_i and infinite radius. The discs are placed in a viscous liquid; the distances between them are h_k $(k = 1, ..., m-1)$. On the left, the disc system is bounded by an infinite plane OA at a distance h_0 from the last disc and on the right by an infinite plane O_1B whose distance from the last disc on that side is h_n (see figure). In a special case the planes OA and O_1B or one of them, may move off to infinity. The

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On Non-stationary Heat Transmission Through a System of Discs
Rotating in a Viscous Liquid

following problem is considered. Suppose at $t = 0$ each of the discs begins to rotate with an angular velocity $\omega_i(t)$ $(i = 1, \ldots, n)$. It is required to find the motion of the liquid between the discs and the temperature distribution in the system if the planes OA and O_1B are maintained at a temperature which is a function of the distance from the centre and of time, so that $T = T_0(r,t)$ on OA and $T = T_1(r,t)$ on O_1B. In a special case when both OA and O_1B are at infinity, the above relations will be the boundary conditions at infinity. It is assumed that at $t = 0$ the temperature of all the discs and the liquid is the same. It is assumed also that the density and the viscosity μ of the liquid are constant. In that case, the dynamic problem can be solved independently of the thermal problem. Since the discs have an infinite radius it follows that the flow of the liquid in any given gap between the discs cannot have any effect on the flow

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On Non-stationary Heat Transmission Through a System of Discs
Rotating in a Viscous Liquid

in any other gap and will be fully determined by the
angular velocities of the two discs which bound the
particular gap (Ref 1). When the dynamical problem is
solved, the thermal problem reduces to a solution of the
energy equation (2) and the thermal conductivity - Eq (3).
The former is solved for the gaps between the discs and the
latter for the discs themselves. In these equations, T_k

is the temperature of the liquid in the k-th gap. c_v

is the specific heat at constant volume. λ_{zk} is the

coefficient of thermal conductivity of the liquid. A is
the thermal equivalent of mechanical energy. t_i is the

temperature of the i-th discs, χ_d is the coefficient of

thermal conductivity of the discs, r is the radial
distance. z is the axial co-ordinate as shown in the figure,
t is the time and the velocity components v_{rk}, $v_{\theta k}$

and v_{zk} are determined from Formulae (5) in Ref 1.

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On Non-stationary Heat Transmission Through a System of Discs
Rotating in a Viscous Liquid

Eq (2) can be solved in the form given by Eq (4), in which
p is an integer, t_o is a constant with the dimensions
of time and the functions θ_{2j} should be determined from
Eqs (15) in Ref 1. Eq (3) can be solved in the form (5)
in which the functions θ_{2i} ($i = 1,2,\ldots,n$; $l = 0,1,\ldots,p$)
satisfy Eqs (6). Solutions given by Eqs (4) and (5) must
satisfy the conditions given by Eqs (7) and, in addition
to these, the boundary conditions (8) must also be satis-
fied where $a_{2l}(t)$ and $b_{2l}(t)$ are given functions of
time. It is clear from this that the integer p in (4)
is given by the highest power of r in the boundary
conditions (8). Each of the functions
$\theta_{2j}^{(k)}$ ($j = 0, 1, \ldots, p$; $k = 0,1,\ldots,n$) is a solution of
a parabolic equation (Ref 1) and hence it is determined from
this equation and the initial conditions to within two
arbitrary constants. Thus, the solution (4) contains

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On Non-stationary Heat Transmission Through a System of Discs
Rotating in a Viscous Liquid

$2(n + 1)(p + 1)$ constants. Similarly, solution (5)
contains $2n(p + 1)$ arbitrary constants after the initial
conditions have been satisfied. The solution (4)-(5)
contains $2(p+1)(2n+1)$ arbitrary constants. Since
conditions (7) must be satisfied for any value of r, it
follows from the form of (4)-(5) that conditions (7)
give $4n(p+1)$ relations for the functions
$\theta_{2j}^{(k)}$ and $\theta_{21}^{(1)}$ which, together with the $2(p+1)$ conditions
which result from (8) give just the $2(p+1)(2n+1)$ relations
to determine the $2(p+1)(2n+1)$ arbitrary constants. It
follows that, generally speaking, the problem is soluble.
There are 1 figure and 1 Soviet reference.

SUBMITTED: April 24, 1958

Card 5/5

TIRSKIY, G.A. (Moscow)

Nonstationary heat transfer through a system of disks rotating in a viscous fluid. Izv. AN SSSR. Otd.tekh.nauk no.7:106-107 Jl '58.

(Disks, Rotating)   (Heat--Transmission)

(MIRA 11:9)

10(2)

AUTHOR: Tirskiy, G.A. (Moscow)   SOV/40-22-4-22/26

TITLE: On a Rigorous Solution of the Energy Equation in the Special
              Case of Motion of a Viscous Incompressible Liquid (Ob odnom
              toohnom reshenii uravneniya energii v chastnom sluchaye
              dvizheniya vyazkoy neszhimayemoy zhidkosti)

ABSTRACT: With the aid of the elliptic functions given by Weierstrass
              the author calculates a rigorous solution of the energy
              equation for a viscous incompressible liquid. He considers
              the special case of a plane stationary flow between two non-
              parallel plane walls, whereby the Prandtl number is put
              equal to 1. If in the obtained solution one passes from the
              elliptic functions of Weierstrass to the Jacobi functions
              given in tabulated form, then the solution can also be re-
              presented in the form of diagrams and tables.
              Starting from the Navier-Stokes equations the author cal-
              culates at first a solution for the temperature profile of
              the flow and discusses it for several special cases. It can

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On a Rigorous Solution of the Energy Equation in   SOV/40-22-4-22/26
the Special Case of Motion of a Viscous Incompressible Liquid

be taken from the solution that the temperature profile for
a symmetric distribution of the velocities is symmetric too.
Conversely there corresponds to an unsymmetric velocity
distribution an unsymmetrical temperature profile. In all
the special cases investigated in the paper the temperature
profile is directed opposite to the velocity distribution.

If the Prandtl number is not equal to 1, then the initial
equations cannot be integrated. However, it is possible to
obtain also a rigorous solution for one special case with
the aid of the Weierstrass functions. This solution is only
indicated but not discussed.
There are 10 figures, and 5 references, 1 of which is Soviet,
1 German, and 3 are English.

SUBMITTED: September 4, 1956

Card 2/2

AUTHOR: Tirskiy, G. A.   20-119-2-8/60

TITLE: Unsteady Flow with Heat Transfer in a Viscous
             Incompressible Liquid Between Two Rotating Disks With
             a Liquid Injection (Nestatsionarnoye techeniye s
             teploperedachey v vyazkoy neszhimayemoy zhidkosti
             mezhdu dvumya vrashchayushchimisya diskami pri
             nalichii vduva)

PERIODICAL: Dok'ady Akademii Nauk SSSR, 1958, Vol 119, Nr 2,
             pp 226-228 (USSR)

ABSTRACT: The flow investigated here is supposed to form out of the
             state of rest between two infinite disks at a distance h.
             The one of the two disks revolves with the time dependent
             angular velocity $\omega_o(t)$ and the other with the angular
             velocity $\omega_1(t)$. From the first disk a steady injection
             with the time dependent velocity $v_o(t)$ occurs and from
             the second disk with the velocity $v_1(t)$. The boundary
Card 1/3   conditions of wetting and the injection present, as well

Unsteady Flow With Heat Transfer in a Viscous   20-119-2-8/60
Incompressible Liquid Between two Rotating Disks With
a Liquid Injection

as the initial conditions determined by the absence of
an initial velocity are put down. Then the solution
of the Navier-Stokes equation (Nav'ye-Stoks) is put
down for the axially symmetric case in the absence of
mass forces. The functions F, G and H occuring in this
solution must satisfy a given system of nonlinear partial
differential equations. Also the limit conditions belonging
to this system as well as its initial conditions are put
down. Although the considerations discussed hold for
infinite disks the results obtained can be used also
for disks with a finite radius R when this radius is
great compared to the distance h. Expressions are put
down for the resistance moments M_o and M_1 of the disks

with the radius R. The problem of the heat transfer in
a viscous incompressible liquid can as is known, be
solved when the solution of the dynamic problem is known.
The author shows that: the unsteady energy equation put

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Unsteady Flow With Heat Transfer in a Viscous
Incompressible Liquid Between two Rotating Disks With   20-119-2-8/60
a Liquid Injection

down in a cylindric coordinate system has an exact
solution in the case of axial symmetry; this solution
is put down here. Finally the author shortly discusses
the following boundary value problems: a) The case with
radially changing temperature, b) The case with radially
changing thermal flow. After the solution of the thermal
problem the local Nusselt (Nussel't) numbers N_0 and N_1
can be determined by means of the given formulae.

PRESENTED: October 22, 1957, by L. I. Sedov, Member, Academy of
                Sciences USSR

SUBMITTED: October 1, 1957

AVAILABLE: Library of Congress

Card 3/3

HARSNY, G. A.

Moscow. Fiziko-tekhnicheskiy institut

Issledovaniya po mekhanike i prikladnoy matematike (Studies in Mechanics and Applied Mathematics) Moscow, Oborongiz, 1959. 252 p. (Series: Its Trudy, vyp. 5) 2,150 copies printed.

Sponsoring Agency: USSR. Ministerstvo vysshego obrazovaniya.

Ed.: K. D. Laytsev, Engineer; Ed. of Publishing House: S. D. Krasnov; Tech. Ed.: N. I. Rubalchova; Managing Ed.: L. S. Zuckermann, Engineer.

PURPOSE: This book is intended for scientific workers, engineers, and senior students working in the appropriate field of science and technology.

COVERAGE: The book, the third issue of the Proceedings of the Moscow Fiziko-tekhnicheskiy institut (Moscow Physical and Technical Institute), contains a number of articles. The first half of the book concerns hydroaerodynamical problems (motion of a heavy liquid, calculation of pressure distribution along a solid of revolution, surface wave, etc.). The second half of the book is devoted to the theoretical and experimental study of the deformation of solids (design of a thin-walled spherical shell, plastic torsion, etc.) and to certain problems of applied mathematics. No personalities are mentioned. References are given after most of the articles.

Hiruky, G. A. The Exact Solution for Heat Transfer Through a Flat
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Shcherbina, Yu.A. Designing a Temperature Profile for the Wake of a
Body Steadily Burning Body   99

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Rumyantsev, V.V. On the Effect of Gravity on Ejection During an
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Nikiforov, A. I. Approximate Method of Designing a Thin-Walled
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chanics in the Homogeneous Deformation of Strain-Hardened Metals in the
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for Systems of Differential Equations With Quasiperiodic Right Sides 247

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Kruglov, V. A. Broadening of the Solutions of Nonlinear Equations
in the Analytic Case   276

AVAILABLE: Library of Congress

Card 1/1

SOV/24-59-2-7/30

AUTHORS: Tirskiy, G. A., Trenogin, V. A. (Moscow)

TITLE: The Determination of the Temperature Field of a Gas Turbine
           Cooling Vane (Opredeleniye temperaturnogo polya okhlazhdayem-
           oy lopatki gazovoy turbiny)

ABSTRACT: The problem of finding the temperature field of a thin
           body in the stream of hot gas, i.e. of a thin disc of a gas
           turbine, can be solved from one of the expressions (1.1) and
           (1.2), where x – coordinate along the shaft, $T(x)$ – tem-
           perature (unknown), $S(x)\lambda(x)$ – cross-section of the shaft,
           $p_e(x)$ and h – perimeter and length of the shaft, $\alpha_e(x)$ –
           coefficient of heat transfer from gas to the shaft, $T_e(x)$ –
           temperature of friction. When a cooling system is applied
           in the channels, the Eq (1.1) takes the form of Eq (1.3),
           where $p_i(x)$ – total perimeter of channels, $T_i(x)$ – cool-
           ing temperature, $\alpha_i(x, T$ and $T_i(x))$ – coefficient of heat
           transfer which, in the case of free convection depends on the
           difference of temperatures $T - T_i(x)$. The latter relation-
Card 1/6   ship determines the flow inside the channels. It is expressed